

ROLE OF EPITHELIAL MAPPING IN HIGH CORNEAL ASTIGMATISM USING COMBINED ANTERIOR SEGMENT OCT AND SCHEIMPFLUG CAMERA TECHNOLOGY

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Introduction

A non-contrast method based on the low-coherence interferometer is the idea of optical coherence tomography (OCT). OCT’s high axial resolution shows improved delineation of the corneal surface. Systems that use spectral-domain anterior segment OCT (AS-OCT) can offer both epithelial mapping and pachymetry. It is well known that the corneal epithelium may remodel, concealing underlying stromal abnormalities. Imaging and analysis of the corneal stroma and epithelium each separately will surely lead to new discoveries that will deepen our knowledge of keratoconus. Regarding corneal remodeling in ectatic conditions, epithelium changes come first then topographic changes happen. Epithelial mapping-based modalities are trying to find epithelial based diagnostic methods for early detection of early corneal ectasia.

Aim of the work

The aim of this study was to detect the role of epithelial thickness mapping in high corneal astigmatism using anterior segment OCT (MS-39).

Patients and Methods

The study was an observational study, which included 34 eyes of patients with corneal astigmatism more than 2.00 D. Inclusion criteria: • Age from 6 to 35 years old. • Patients with high corneal astigmatism more than 2.00 Diopters. Exclusion criteria: • Patients with corneal pathology, dry eye or previous corneal surgery. • Other ocular diseases as uveitis, cataract or glaucoma. • Pregnancy and lactation. Setting: Private centre in Alexandria. Time Period: Between October 2022 and january 2023. All patients were subjected to the followings: – History taking including age, family history of keratoconus, any previous surgical ophthalmological history . – Objective refraction by autorefractometer. – Subjective refraction by clinical trial. – Uncorrected visual acuity and best spectacle corrected visual acuity. – Anterior segment examination by Slit-lamp. – Intra ocular pressure measurement. Intra ocular pressure measurement. – Fundus examination by 90 lens using slit-lamp. – Using retinoscope searching for Scissoring reflex which suggest keratoconus. – Tomographic imaging using Scheimpflug camera device. – Anterior segment OCT imaging using MS-39. • Using epithelial thickness map from MS-39, measurements included the thinnest location and its position, minimal and maximal thickness within 3 mm zone and inbetween 3-6 mm zone and their location. (Figure 9) • Pentacam was used to examine central, superior, inferior, nasal, temporal zones. Measurements included central corneal thickness and thinnest location point and its position from pachymetry map, then we correlated to the curvature map and posterior elevation map.

Results

Table (1):Relation between astigmatism type and different parameters (n = 34)

	Astigmatism		t	P
	Regular (n = 26)	Irregular (n = 8)		
Central Corneal Thickness (ant OCT)				
Mean ± SD.	524.3 ± 33.27	404.4 ± 45.08	8.195*	<0.001*
Median (Min. – Max.)	525.0(457.0 – 590.0)	402.5(360.0 – 502.0)		
Central Epithelial Thinnest Location				
Mean ± SD.	51.88 ± 3.30	41.38 ± 4.96	6.974*	<0.001*
Median (Min. – Max.)	51.50 (47.0 – 62.0)	41.50 (34.0 – 50.0)		
Nasal epithelial Thinnest Location				
Mean ± SD.	48.12 ± 2.75	46.50 ± 5.13	0.854	0.417
Median (Min. – Max.)	49.0 (43.0 – 53.0)	48.50 (37.0 – 53.0)		
Temporal epithelial Thinnest Location				
Mean ± SD.	46.38 ± 2.59	43.88 ± 3.98	2.102*	0.044*
Median (Min. – Max.)	46.0 (41.0 – 52.0)	44.0 (38.0 – 50.0)		
Inferior epithelial Thinnest Location				
Mean ± SD.	49.35 ± 4.05	44.38 ± 4.14	3.022*	0.005*
Median (Min. – Max.)	50.0 (40.0 – 56.0)	44.50 (38.0 – 51.0)		
Superior epithelial Thinnest Location				
Mean ± SD.	43.92 ± 3.25	46.38 ± 5.10	1.625	0.114
Median (Min. – Max.)	44.0 (38.0 – 49.0)	47.0 (39.0 – 53.0)		

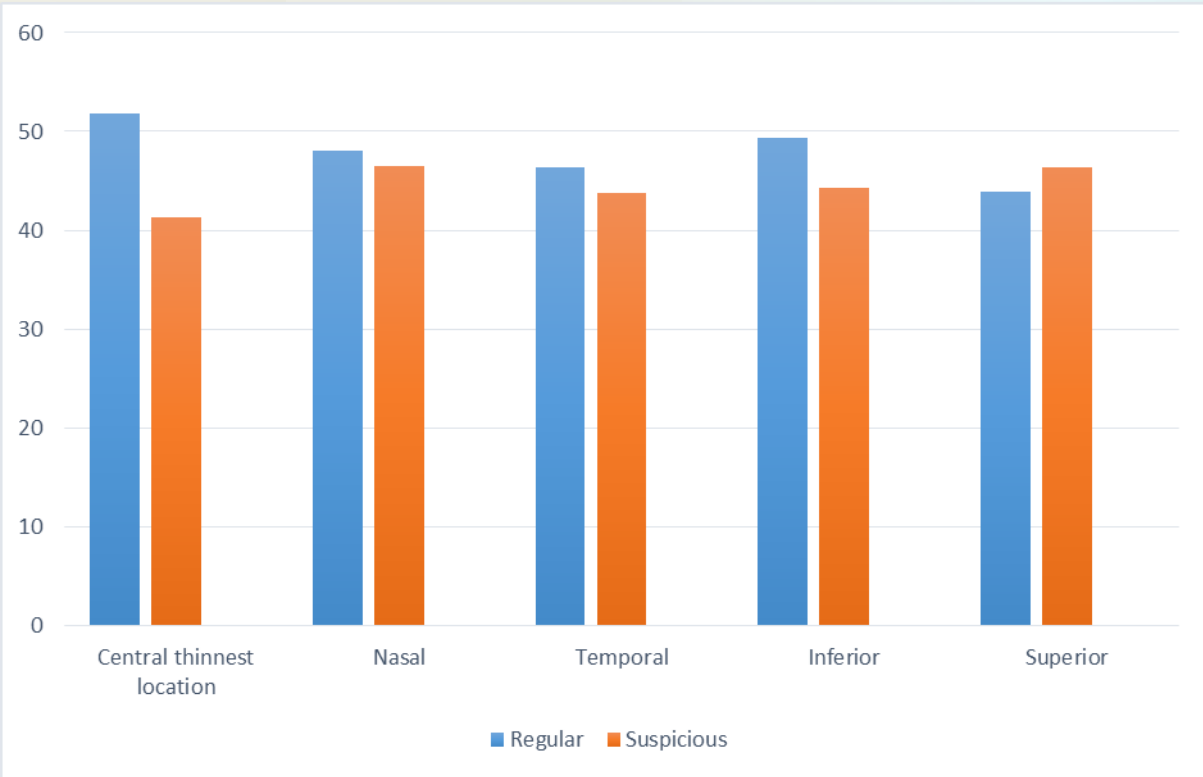


Figure (1): Relation between astigmatism and different parameters (n = 34)

Conclusion

Based on the study-supported data, we found that a crucial factor in distinguishing irregular astigmatism from normal high regular astigmatism is the measurement of epithelial thickness by anterior segment optical coherence tomography epithelial mapping.



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